BRAILLE MIRRORING

TECHNICAL FIELD

[0001] This subject matter is generally related to providing content to Braille displays.

BACKGROUND

[0002] Braille displays are commonly used to allow a visually disabled user to experience content generated by a computer. A user can also use his or her Braille display to interact with the computer. However, most computers only accommodate a single Braille display at a time.

SUMMARY

[0003] Techniques and systems for Braille mirroring are disclosed. These techniques can be used to send content presented on a host device to multiple Braille displays. The techniques can also be used to determine whether to respond to input received from a Braille display. In one aspect, content is received in a reference format, converted into Braille content, and separately formatted for each of a group of Braille displays, where at least two of the Braille displays have different formats. The formatted content is then sent to each of the Braille displays. In another aspect, data identifying a group of Braille displays and a primary Braille display is stored. First text corresponding to first content displayed on a display device is received, and formatted Braille content is sent to each of the Braille displays. In yet another aspect, data identifying a group of Braille displays and a primary Braille display is stored. Input requesting that a data processing apparatus perform an action is received from one of the Braille displays, and it is determined whether to perform the action, based in part on whether the requesting Braille display is the primary Braille display.

[0004] Particular embodiments of the subject matter described in this specification can be implemented to realize one or more of the following advantages. Multiple users can receive content from the same computer. Each user can receive the content through a Braille display configured to accommodate the user's needs or preferences. This allows students in a classroom, collaborators on a project, or audience members at a presentation to each experience content in a way best suited to their individual needs. Control of the computer can be monitored so that only a primary Braille display can control the computer, or all Braille displays can control the computer. This allows a single user to retain control of the computer when appropriate (e.g., when the user is teaching a classroom of students), and allows users to collaborate together when appropriate (e.g., when they are working on a collaborative project).

DESCRIPTION OF DRAWINGS

[0005] FIGS. 1A-1B illustrate overviews of example systems.

[0006] FIG. 2 illustrates an example architecture of a Braille mirroring system.

[0007] FIG. 3 is a flow diagram of an example process for providing Braille content to multiple Braille displays.

[0008] FIG. 4 is a flow diagram of an example process for presenting Braille content and tracking which Braille display is a primary display.

[0009] FIG. 5 is a flow diagram of an example process for processing input received from a Braille display.

DETAILED DESCRIPTION

Example Applications of Braille Mirroring

Teaching Scenario

[0010] FIG. 1A illustrates an overview of an example system 100. The system 100 includes a host device 102 that is coupled to several Braille displays 104. Each Braille display, also known as a refreshable Braille display or Braille terminal, is a device that presents a tactile representation of Braille characters, e.g., by raising and lowering pins associated with cells on the Braille display. While six Braille displays are shown in FIG. 1A, any number of Braille displays, including more than six and less than six, can be connected to the host device 102. The Braille displays 104 can be physically coupled to the host device 102, or can be coupled by other means, for example through a wireless connection. Example physical connections include, but are not limited to, Universal Serial Bus (USB), Ethernet, and FireWire™ connections. Example wireless connections include, but are not limited to, RFID, Bluetooth™, wireless network, ultra wideband, z wave, and ZigBee™ connections.

[0011] The example below will be described in reference to a classroom setting. However, the system 100 can be used in a variety of other contexts, for example, meetings, conferences, and other places groups of people gather to receive information from a primary source. For example, the system can be used when a speaker is giving a computerized slide presentation to an audience of Braille users.

[0012] In the system 100, a teacher leading a classroom uses the host device 102. The teacher may control the host device 102 using one of the Braille displays 104 (e.g., Braille Display 104a). Alternatively, the teacher may control the host device 102 using other input devices such as a keyboard and mouse, and be presented with an image of a virtual Braille display on the display 108 of the host device 102.

[0013] In response to commands from the teacher, the host device 102 generates content 106 (shown for illustrative purposes on the display 108). The content 106 is the text "101 Tips for Surviving Advanced Calculus." While the content 106 is text, the content 106 can alternatively or additionally include other forms of content, including, but not limited to, images, multimedia content, and spoken content (including synthesized speech).

[0014] The host device 102 translates the content 106 to a Braille format and sends it to each of the Braille displays 104. The host device 102 sends the same content to each of the Braille displays; however, the host device 102 formats the content according to the display capabilities of each Braille display. For example, Braille display A 104a has a total of ten cells 110. In contrast, Braille display 104d has a total of only four cells 112. Thus, the host device would send ten characters at a time to Braille Display 104a, and would send only four characters at a time to Braille display 104d. If the host device 102 has more content than a Braille display 104 can display at one time, a user can use the buttons on the Braille display 104 to pan back and forth through the content.

[0015] In order to maintain order in the classroom, the teacher will likely want to be the only user who can control what content is presented to the students. Therefore, the host device 102 stores data indicating that the Braille display 104 associated with the teacher is the primary display, and only